China's State-Owned Enterprises as Climate Policy Actors

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Preface

China, one of the world's major economies, is a key player in the global climate change negotiations – to make a future international climate agreement meaningful, China would need to be on board. China has introduced a wide array of mitigation measures, has pledged to cut its carbon intensity by 40% to 45% of the 2005 level by 2020 and has made notable investments in renewable energies.

This report concentrates on China's state-owned enterprises and their role in the Chinese climate policy. Focus is in particular given to two of the main emitting sectors, power generation and steel production, which hold the key to a large share of China's mitigation potential. It can be demonstrated that the state-owned enterprises have played a significant role in mitigation actions in these two sectors. As a wider mitigation-relevant task, the state-owned enterprises have led the modernization of the steel industry to enable better-quality products aiming at supporting the development of new high-tech sectors, like renewable energy. State-owned enterprises have also made significant contributions to targeted mitigation measures implemented in China, especially through the so-called 1000 Enterprises Programme, while also making it possible to close down small, inefficient plants.

As for China's international climate position, state-owned enterprises should be recognized as important domestic stakeholders. They implement a range of policies and measures, which are in turn needed to enable targets and pledges. Even though China's international climate position and, for example, definition of nationally appropriate mitigation actions (NAMAs), depend on the political choices of the central bureaucracy, state-owned enterprises are important also beyond their facilitating role, due to their influential position in domestic policy choices.

The study has been carried out by Fridtjof Nansen Institute for NOAK, a working group under the Nordic Council of Ministers. The aim of NOAK is to contribute to a global and comprehensive agreement on climate change with ambitious emission reduction commitments. To this end, the group prepares reports and studies, conducts meetings and organizes conferences supporting the Nordic negotiators in the UN climate negotiations.

Helsinki April 2013

Harri Laurikka

Chair of the Nordic Working Group
for Global Climate Negotiations

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Summary

China has become the largest emitter of greenhouse gases in the world. Estimates for 2010 vary between 7.3 and 8.3 Gt CO₂e, representing some 24 % of total global emissions. Given its position as a developing country and its insistence on the principle of common but differentiated responsibilities in the UN climate regime, it remains unclear what China might be willing to commit to under a future global climate agreement. Beijing has pledged cuts of 40 to 45 % in the carbon intensity of the economy during 2005–2020, and has included a corresponding target in its 12th Five-Year Plan (FYP).

Today's Chinese bureaucratic system is in flux, and coordination problems between administrative units make policy implementation unpredictable. The central bureaucracy sees the state-owned enterprises (SOEs) as a partial solution to this problem, and as an alternative preferable to the involvement of local and private actors in terms of controlling key sectors. Thus, it has opted for control over market-driven efficiency, accepting short-term losses made by SOEs, rather than the lack of control over independent private actors. Unlike the case with private-sector actors, the central bureaucracy can control SOEs through the informal *guanxi* and *nomenklatura* networks.

SOEs are provided with state support to pursue coordinated long-term objectives in the strategic and pillar industry sectors deemed beneficial to the economy as a whole, including expansion of China's share in the global market and the launching of niche industries. Various policies in the two sectors in focus in this study – power generation and steel production – rely on tasking SOEs to proceed with mitigation-relevant policy implementation. Policies allocated to SOEs for implementation range from efficiency improvements and the launch of new technologies (wind power) and infrastructures (liquefied natural gas (LNG) and a modern power grid) and gaining access to better raw materials (iron ore), to the centralization of production under large units instead of small-scale local production (coal-fired power generation, steel production) and its relocation (steel production).

However, the dependence of SOEs on the central bureaucracy can be questioned. The political and economic influence of the SOEs in policy formation has increased through the same informal networks that facilitate their loyalty to the bureaucracy, *guanxi* and *nomenklatura*, and as a result of foreign economic activities that serve to distance them from the central bureaucracy. Thus far, most mitigation policies have been eco-

nomically favourable from the SOE perspective; however, their approach to mitigation actions may change once tasks start becoming more costly and involve fewer synergies with the core goals of SOE than at present.

SOEs hold the key to implementing a large share of the country's mitigation potential, and thus merit greater attention from analysts studying China's role in global climate policy. Domestic targets to be included in future FYPs as well as China's international-level pledges are facilitated by such existing policy measures, with predictable outcomes. The central bureaucracy sees the dominance of SOEs over main emitting activities as a safeguarding factor – as is clear from the centralization policies chosen by the central bureaucracy for the power-generation and steel sectors. These two sectors also demonstrate a potential for China to announce more detailed nationally appropriate mitigation actions (NAMAs) beyond the current economy-wide carbon intensity and renewable energy targets based on the policy implementation of SOEs. Although the SOE have a crucial facilitating role in terms of future emission trends, the country's international climate position and definition of NAMAs are not for them to decide: these matters depend on the political choices of the central bureaucracy.

Abbreviations

BOF	Blast furnace/basic oxygen converter method
CCP	Chinese Communist Party
CDB	China Development Bank
China Exim Bank	China Export-Import Bank
CNOOC	China National Offshore Oil Company
CNPC	China National Petroleum Corporation
EAF	Electric arc furnace
EIA	U.S. Energy Information Administration
ETS	Emissions Trading System
FYP	Five-year plan
GDP	Gross Domestic Product
GNI PPP	Gross National Income per person PPP
IEA	International Energy Agency
LNG	Liquefied Natural Gas
LIBOR	London Interbank offered rate
NAMA	Nationally Appropriate Mitigation Action
NDRC	National Development and Reform Commission
NEA	National Energy Administration
NEC	National Energy Commission
OECD	Organization for Economic Co-operation and development
PV	Photo-voltaics
PAMs	Policies and measures
SERC	State Electric Regulatory Commission
SASAC	State-Owned Assets Supervision and Administration Commission
SOEs	State-owned Enterprises
USC	Ultra-supercritical
UNFCCC	United Nations Framework Convention on Climate Change
EIA	U.S. Energy Information Administration
VAT	Value Added Tax

1. Introduction

China ranks as the largest emitter of greenhouse gases in the world. In the absence of annual GHG inventories, the exact figures remain unclear, with estimates varying between 7.3 Gt by the International Energy Agency (IEA)¹ to 8.3 Gt by the US Energy Administration² (2010 emissions from fuel combustion). Based on the IEA data, this represents 24.1% of global emissions. It is obvious that any international climate agreement cannot succeed without China on board; this is becoming increasingly crucial in terms of limiting global warming to 2 °C, as recommended by the Inter-governmental Panel on Climate Change.

China has introduced an impressive portfolio of mitigation measures, and has pledged to cut its carbon intensity by 40% to 45% of the 2005 level by 2020. While generally driven less by environmental considerations than by economic and energy security concerns (the competitiveness of the Chinese products in export markets; the adequacy of energy sources to maintain Gross domestic product (GDP) growth), various mitigation actions are allocated to domestic actors such as regional administrations and enterprises. However, with the ongoing transformation towards a more market-based economic system as well as the influence of the traditional power structures (the *nomenklatura* system and the *guanxi* network), the country's policy-making system today is fractured and in flux.

The central government – which plans mitigation policies – and its regulatory authorities have varying levels of control over different high-emitting sectors depending on how privatized or centralized the sectors are, and the level of political contacts that the companies' leadership enjoy. The ongoing reform of centralizing activities in the strategically important sectors under state-owned enterprises (SOEs) is driven by efficiency as well as control-related benefits relevant to mitigation policies. However, the efficiency of Chinese SOEs has been questioned by Western economists.³

¹ IEA (2012): Key World Energy Statistics 2012, <http://www.iea.org/textbase/nppdf/stat/12/kwes.pdf>

² EIA (2011): International Emissions, <http://www.eia.gov/environment/data.cfm>

³ The World Bank (2012a): *China 2030. Building a Modern, Harmonious and Creative High-Income Society*, pp. 21–22.

This report focuses on SOEs and their role in the Chinese bureaucratic structure. We explore the changing power structures in two of the main emitting sectors, power generation and steel production, to provide examples of the relevance of this development to China's future emission trends. We argue that the policy of centralizing strategically important industrial sectors under a small number of SOEs can, over time, deliver significant mitigation impacts on key emitting sectors. This is due to various reasons: economics of scale, financial resources made available for investments in more efficient technology, and the ability of the central bureaucracy to enforce policies driven by – *inter alia* – climate mitigation benefits.

The main focus of this report is on describing the role of SOEs in China's mitigation-relevant policies. In order to do this, we ask:

- What kind of mitigation relevant measures SOEs are responsible for / involved in?
- What is driving these measures?
- How could they contribute to mitigation efforts?
- What problems have been experienced with these measures and the involvement of SOEs?
- What links can be identified between SOEs and China's mitigation targets / NAMAs?

1.1 Methodology

The research results presented here are rooted in a combination of literature reviews, statistical data provided by the IEA, the U.S. Energy Information Administration (EIA) etc. and semi-structured interviews conducted over the past three years, mainly in 2011 and 2012. Important contributions have come from the information and guidance provided by personal networks within the Chinese energy administration. Nine semi-structured interviews were conducted to acquire information on the relevant elements of the administrative system, and eleven interviews to better understand the Chinese approach to climate policy and mitigation. Due to the positions held by some of the interviewees within the energy administration, all have been anonymized here.

The statistics used in the two case studies are based primarily on IEA data. We chose to use the IEA New Policies Scenario, as it correlates best with the Chinese statistical yearbook up to 2011; moreover, its estimates take into account all Chinese policy decisions as of mid-2011. Beyond the coverage of IEA data, we have relied on Chinese statistics and information in explaining estimates for sub-sectors. This has been difficult, as sub-sectors such as the coal-fired power and iron industries offer few if

any statistical overviews of the share of low-capacity production facilities. As a result, the rough estimates presented are based on the combination of Chinese and international estimates, supplemented with information from our semi-structured interviews. As always, the reader should bear in mind that it is difficult to access Chinese data, and that statistics are not always reliable. For one thing, they are often adjusted significantly after the preliminary figures have been issued.⁴

We have chosen the power sector and steel sector as case studies due to their importance as emitters of CO₂ as well as their changing role as strategic industries. Further, these two sectors can illustrate the political decision-making processes relevant to climate-mitigation measures. As demonstrated by the transformation of the strategic industries, the power sector is set to maintain its position as a cornerstone for national economic growth, while simultaneously developing a diverse technologically advanced production mix. Parts of the steel sector will gradually lose in importance as the economy focuses more on high-quality products and service-based industries. Mitigation actions are a side-effect of these trends and related developments.

Our case studies are intended to provide examples of the relevance of the SOE structure to China's mitigation actions. What kind of mitigation actions have the SOEs been involved in, and why? What emission-relevant tasks have the central bureaucracy allocated to the SOEs? What are the main differences between the SOEs and other ownership structures in terms of achieving mitigation goals? What problems have been experienced? The case studies are presented as follows:

- structure of the case sector – including the role of SOEs across the sector – and its relevance to climate mitigation
- analysis of the problems related to the ownership and control structures on the sector, and their relevance to national mitigation efforts
- climate-relevant examples of problems SOEs have been set to solve, and outcomes of such processes where relevant.

⁴ Zhang, ZhongXiang (2010): Assessing China's Carbon Intensity Pledge for 2020: Stringency and Credibility Issues and Their Implications. East-West Center Working Paper, Economic Series No. 113, October 2010.

1.2 Structure of the Report

We begin by outlining China's GHG emission trends and climate mitigation efforts to date. Then follows a description of the bureaucracy and decision-making system, where we outline the Chinese system of industrial categories by strategic importance, the bureaucratic as well as the traditional *nomenklatura* and *guanxi* systems for managing industry, and finally, SOEs and their role in the country's industrial sector. Sections 4 and 5 present case studies of two high-emitting sectors, power generation and steel production, focusing on the role of SOEs in developments relevant to climate mitigation.

2. China's Climate Policy

2.1 Climate Indicators

As China is a non-Annex I country under the United Nations Framework Convention on Climate Change (UNFCCC), it is not obliged to report annual GHG inventories internationally, and it is only in the process of developing a comprehensive domestic inventory system. Thus, a range of differing estimates have been developed. As illustrated in Graph 1, the trends show the same increasing direction of emissions. China's emissions have been skyrocketing since 2000, and more than doubled (depending on the estimate) during the first decade of the 2000s. The highest figure (7.2 Gt) comes from the World Resources Institute; the IEA estimate is 0.7 Gt lower (6.5 Gt) in 2008. On a global scale, this difference represents some 2.2% of total emissions based on World Bank figures for total emissions in 2008.

Graph 1. Comparison of estimates of Chinese CO₂ emissions from fuel combustion

Sources: IEA: Beyond 2020 Database: CO₂ Emissions from Fuel Combustion (detailed estimates), Scenario Approach © OECD/IEA 2013, <http://data.iea.org/ieastore/default.asp>; World Resources Institute (2012); The World Bank database, <http://data.worldbank.org>; EIA: Total Carbon Dioxide Emissions from the Consumption of Energy, www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=90&pid=44&aid=8

Table 1 shows the extraordinary pace of China's recent GDP growth; this helps to explain the skyrocketing emissions. The main drivers of emission growth have been the rapid growth in GDP and urbanization. Further, structural changes in the economy, like the move from industry towards services, are crucial as regards emissions, and have a significant impact on the carbon intensity of the economy.⁵ Motivated by, *inter alia*, resource scarcity and environmental problems, there has been discussion of imposing active limits on the GDP growth (max. 7% per annum), which would have a significant impact on GHG emission trends.⁶

Table 1 also shows the development of annual gross national income per person during the same period. Even though significantly below the world average (USD 11,574 in 2011) let alone the Organization for Economic Cooperation and Development (OECD) average (USD 35,120 in 2011), the growth trend has been very strong in recent years. Income was three times higher in 2011 in comparison to 2000. However, here it is important to bear in mind the uneven distribution of income, which in 2008 still left 13.1% of the population under the poverty line of USD 1.25/day.⁷

Table 1. China's annual GDP growth 2000–2011, in constant 2000 USD, and Gross National Income per person PPP, USD

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
GDP %	8.4	8.3	9.1	10.0	10.1	11.3	12.7	14.2	9.6	9.2	10.4	9.1
GNI PPP	2,340	2,560	2,840	3,180	3,590	4,090	4,750	5,580	6,230	6,820	7,600	8,430

Source: The World Bank database, <http://data.worldbank.org>

2.2 China's Climate Policy

2.2.1 Announcements and Targets

China has a history of low success in delivering environmental policies since they were first introduced in the 1980/1990s. This has been explained by the sectoral nature of early environmental policies. During the last decade, the Chinese leadership started considering climate policies relevant to its core priorities – political stability and future growth – both of which are threatened by energy scarcity and environmental deg-

⁵ McKinsey&Company (2009): China's Green Revolution: Prioritizing Technologies to Achieve Energy and Environmental Sustainability, www.mckinsey.com/client_service/sustainability/latest_thinking/greenhouse_gas_abatement_cost_curves, pp. 32–36.

⁶ Lewis, J. (2011): Energy and Climate Goals of China's 12th Five-Year Plan. Pew Center, March 2011; *The Guardian* (28 February 2011): China to slow GDP growth in bid to curb emissions, www.guardian.co.uk/environment/2011/feb/28/china-gdp-emissions

⁷ The World Bank database, <http://data.worldbank.org/indicator/SI.POV.DDAY>

radation. The Scientific Development Concept adopted in 2008 implies dramatic reductions in the energy and pollution intensities of socio-economic development, and has become the guiding principle of development policy.⁸ China adopted its first National Climate Change Programme in 2007, and issued a White Paper on Climate Policy in October 2008. These documents, together with the Five-Year Plans (FYPs) communicate China's national climate policy.⁹ Early implementation of low-carbon policies has included energy-efficiency standards introduced in 1998, an energy-efficiency labelling system for appliances in 2004, and fuel-efficiency standards for vehicles which took effect in 2005.¹⁰ The National Climate Change Programme included the targets of cutting energy intensity by 20% in the course of 2005–2010, and increasing the use of alternative energy to 10% of primary energy use by 2010.¹¹ This was taken up already in the country's Renewable Energy Law passed in 2005 and revised in 2007. Further, the Renewable Energy Law sets the target of increasing the share of renewable energy sources from 5% in 2005 to 15% by 2020.

The first directly mitigation-relevant target appeared the 11th FYP (2006–2011), which set to reduce the energy intensity of the economy by 20% of the 2005 level by 2010. The 12th FYP (2011–2015) introduced targets for reducing carbon intensity (CO₂ per unit of GDP) by 17% and energy intensity by 16% during the period. Further, the aim is for 11.4% of total primary energy use to be generated from non-fossil sources by 2015, in comparison to 8% in 2011.¹² These targets represent a step towards China's unconditional Copenhagen pledge of reducing carbon emissions per unit of GDP by 40–45% of the 2005 level by 2020, which was announced together with the target of increasing the share of non-fossil fuels to 15% in primary energy consumption by 2020, and of increasing forest coverage by 40 million hectares from the 2005 level by 2020.¹³

⁸ Hallding, K., G. Han and M. Olsson (2009): *A Balancing Act: China's Role on Climate Change*. Stockholm, Regeringskansliet: The Commission on Sustainable Development.

⁹ Teng, Fei, Yu Wang, Alun Gu, Ruina Xu, H. McMahon, and D. Seligsohn (2009): *Mitigation Actions in China: Measurement, Reporting and Verification*. World Resources Institute Working Paper, June 2009, p. 6.

¹⁰ Teng *et al.* (2009), p.13.

¹¹ National Development and Reform Commission (2007): *China's National Climate Change Programme*, www.ccchina.gov.cn/WebSite/CCChina/UpFile/File188.pdf

¹² English.news.cn (2011): *China Aims for Greener Economy Over Next 5 yrs: Former Energy Head*, http://news.xinhuanet.com/english2010/china/2011-03/04/c_13761478.htm

¹³ Wen Jiabo (2010): *Letter from Wen Jiabao to Lars Lokke Rasmussen*, January 2010, http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/chinacphaccord.pdf

This same pledge is listed as China's Nationally Appropriate Mitigation Action (NAMA). This NAMA is a rather macro-level announcement without much detail as to the actual policies and measures (PAMs) planned. However, also many other countries have provided overall targets rather than PAMs, like China.

2.2.2 Implementation

Implementation of the 11th FYP's climate-mitigation targets mostly relied on energy-efficiency improvements (1000 Energy Consuming Enterprises Programme, further: 1000 Enterprises Programme, Ten Key Conservation Projects – see below) and the closure of small and inefficient enterprises. These measures were expected to deliver an emission reduction of 360 Mt CO₂e during the period.¹⁴

The 1.000 Enterprises Programme targeted industrial enterprises accounting for 33% of China's total energy consumption and 47% of industrial energy use in 2004. In practice the programme entailed contracts between large energy-intensive enterprises and the central government. The goal was to cut energy consumption by 100 Mtce, roughly equivalent to 235 Mt CO₂e (based on frozen technology baseline as of 2005); this target was achieved by the end of 2009. Further goals included reducing the unit energy consumption of all major products to the domestic best practice level, and in some cases achieving the international best practice reference numbers. Companies which could demonstrate at least 10,000 tce savings based on measurement were eligible for rebates and rewards from the central government. There were also some province-level funds and differentiated electricity prices based on efficiency levels.¹⁵ The Programme's evaluation showed that 90% of the companies had achieved their targets.¹⁶ The 12th FYP continues this effort by establishing a wider 10,000 enterprises programme.¹⁷

¹⁴ Weiping, Hu (2007): Introduction to the 11th Five-Year Plan on Energy Development. Bureau of Energy, China National Development and Reform Commission. 10 September, www.uschinaogf.org/Forum8/monday/2-Hu%20WeipingNDRC%20Topic-11%20five-year%20plan%20English.pdf

¹⁵ Price, L., X. Wang and J. Yun (2008): *China's Top-1000 Energy-Consuming Enterprises Program: Reducing Energy Consumption of the 1000 Largest Industrial Enterprises in China*. LBNL-519E. Berkeley, CA: Ernest Orlando Lawrence Berkeley National Laboratory, pp. 2, 8–9; Price, L., M. D. Levine, N. Zhou, D. Fridley, N. Aden, H. Lu, M. McNeil, N. Zheng, Y. Qin and P. Yowargana (2011): Assessment of China's Energy-Saving and Emission-Reduction Accomplishments and Opportunities During the 11th Five Year Plan. Energy Policy 39, pp. 2165–2178, p. 2170.

¹⁶ Teng *et al.* (2009), p. 16.

¹⁷ Lewis 2011, p. 1.

A further government-funded programme, *Ten Key Energy Conservation Projects*, for the power and heat, waste, buildings and several other sectors, aimed at energy savings of 250 Mtce.¹⁸ *The Programme of Large Substituting the Small* – the national programme for closing small and inefficient thermal power units (further: the small plants closure programme) – sets out various criteria for closures.¹⁹ Permission to build new, larger units is made conditional on closing down old units.²⁰

The Renewable Energy Law contains purchasing obligations to grid companies, feed-in tariff for biomass and wind electricity, tax instruments as well as subsidies for renewable energy sources.²¹ Value added tax (VAT) has been used as an incentivizing instrument to promote renewable energy.²² Renewable energy targets (installing 200 GW) were achieved in 2009, and exceeded during the 11th FYP.²³

The 11th FYP achieved 19.06% reduction in energy use per unit of GDP during 2005–2010, and the National Development and Reform Commission (NDRC) (2010)²⁴ concluded that the target of 20% intensity cut was “basically met.”²⁵ Total emission reductions from 11th FYP measures have been estimated to represent almost 4.3 Gt in emissions reductions.²⁶ However, judging from various reports, this was no easy task. Progressive growth in the tertiary sector was expected to help in achieving the intensity target – but, against expectations, industrialization continued throughout the second half of the decade.²⁷ There was significant variation among provinces in achieving the goals set for energy-intensity cuts. Rolling blackouts of industrial facilities, emergency closures of production lines, and even power cuts in the regions were

¹⁸ Price *et al.* 2011, p. 2168.

¹⁹ To be closed: all conventional thermal power generating units of below 50 MW; all conventional thermal power generating units of 100 MW and below that have been operating for over 20 years; all conventional thermal power generating units of 200 MW and below that have reached the end of their design lives; all coal-fired generating units with net heat rate at least 10% higher than the 2005 province average or at least 15% higher than the 2005 national average; all generating units that fail to meet environmental standards; all generating units not in compliance with laws and regulations.

²⁰ See e.g. Teng *et al.* (2009), p. 17.

²¹ See for instance Martinot, E. (2010): Renewable Power for China: Past, present and future. *Frontiers of Energy and Power Engineering in China* Vol. 4 No. 3, pp. 287–294.

²² Teng *et al.* (2009).

²³ Bellvrait, E. (2011): Climate Policies in China, India and Brazil: Current Issues and Future Challenges. IDDRI Working Paper No. 16, 12 July 2011.

²⁴ National Development and Reform Commission (2010): Report on the implementation of the 2010 plan for national social and economic development and on the 2011 draft plan for national social and economic development, Fourth Session of the Eleventh National People's Congress, 5 March 2011, <http://online.wsj.com/public/resources/documents/2011NDRCReportEng.pdf>

²⁵ *The New York Times* (4 March 2011): China Reportedly Plans Strict Goals to Save Energy, www.nytimes.com/2011/03/05/business/energy-environment/05energy.html?pagewanted=2&r=1&src=bushn

²⁶ Bellvrait, Elie (2011).

²⁷ Bellvrait, Elie (2011).

forced as a last-minute measure – hardly what the central government had been intending.²⁸

It is difficult to evaluate the contributions of individual policy measures to achieving the set goals in the absence of full data. Price *et al.* (2011) have shown through decomposition analysis (i.e. disaggregation of activity, structural and energy-efficiency factors) that energy efficiency improvements have accounted for most reductions in energy intensity in the economy during the 11th FYP, offsetting the increases in activity and structural changes during the same period.²⁹ Graph 2 shows the estimates of Price *et al.* (2011) on the contributions of the various policy measures to the total during 2006–2008; however, this does not capture the last-minute measures mentioned above.

Graph 2. Contributions of various policy instruments to energy savings, 2006–2008

Source: World Resources Institute (2011).³⁰

²⁸ Zhang, ZhongXiang (2010).

²⁹ However, the frozen deadline of 2005 technology level probably leads to some overestimation of the impacts.

³⁰ World Resources Institute (2011): China FAQs, China's Energy Conservation Accomplishments of the 11th Five-Year Plan, 21 July 2011, www.chinafaqs.org/files/chinainfo/ChinaFAQs_11th_5-Year_Plan_Energy_Conservation_0.pdf

Some lessons have been learnt from the implementation of the 11th FYP. First, regional targets were established following negotiations between local governments and the central government, however, there was little variation on the targets or policy choices between regions.³¹ Second, regional governments had procrastinated with carbon intensity targets, giving priority to economic growth instead. Zhang has suggested that the central government should incorporate these targets in the overall evaluation criteria of the officials and allocate adequate economic resources to the regional level, in order to reduce the dominance of economic growth as a driver of policy.³² Third, evaluating compliance with the targets set involved the considerable bureaucratic burden of sending out inspectors regularly during the 11th FYP.³³ Fourth, the 11th FYP relied on command-and-control policy measures, which have their limitations, especially for regulating medium-sized emission sources. The 12th FYP will introduce more market instruments, to improve performance.³⁴ Pilot phases of provincial emissions trading schemes are already being established, but the original plan of extending the system to the national level from 2015 has been postponed. At the Doha climate negotiations, the Chinese delegation announced that a country-wide emission trading system (ETS) would be included in the 13th FYP in 2016.³⁵

2.2.3 *Climate Diplomacy*

China's actions in international organizations and negotiations are generally guided by three principles of foreign policy: first, concerns that international cooperation may lead to dependency and instability; second, a preference for avoiding situations where core economic interests may be compromised; and, third, the desire to come across as a responsible player that takes active leadership in the Global South.³⁶

China's insistence on the equity principle of Annex I countries taking the lead in global climate mitigation – especially given the foot-dragging by the USA while China took on voluntary commitments – make it unlikely that China will accept legally binding commitments

³¹ Teng, Fei (2012): China: Improving the Local-Central Climate Governance Nexus. IDDRI Working Paper No 8, 12 April 2012.

³² Zhang, ZhongXiang (2010).

³³ Seligsohn, D. (2010): China's System for Measuring, Monitoring, and Reporting Energy and Climate Data. Testimony to the Congressional-Executive Council on China, 1 April 2010.

³⁴ Bellvrait, Elie (2011).

³⁵ *China Daily* (7 December 2012): China eyes nationwide emission trading programs, www.chinadaily.com.cn/business/2012-12/07/content_15994491.htm

³⁶ Hallding, K., M. Olsson, A. Atteridge, A. Vihma, M. Carson and M. Roman (2011): Together Alone. BASIC Countries and the Climate Change Conundrum. TemaNord report 2011: 530, pp. 72–73.

on the international level. Further, China has been taking its central role in the G77 seriously, and sticks to its status as a developing country. The BASIC group can provide China with necessary support for insisting on its positions internationally. Apparently, China sees the principled discussions of equity and common but differentiated responsibilities as the starting point for ADP discussion (a view shared by many other non-Annex I countries); thus debates on ambition levels and the bindingness of the future regime are seen as coming later, after the basic principles have been agreed on.

3. The Governance of Chinese Industrial Sectors

3.1 Introduction

With the financial crisis in 2009, the weaknesses of an export-oriented economy hit China and influenced the turn towards greater reliance on a consumption-driven model of growth. Based on the Chinese state capitalist model, China's government has opened up to let the domestic market interact with today's global market in order to create competitive growth. But the state capitalist model is also meant to secure domestic growth despite the fluctuations and disruptions imbedded in the liberal economic market. The model applies a combination of command-and-control, market-based and non-regulatory instruments to develop competitive industries or national champions within sectors regarded as essential for the long-term growth of the national economy. These industries are closely connected to the state bureaucracy and the Chinese Communist Party (CCP), and can be characterized as *strategic* and *pillar* industries.

3.2 China's Strategic, Pillar and Private Industries

The strategic and pillar industries differ from private industries in terms of the degree of state ownership and state involvement in setting their long-term development plans. The pillar industries are sectors that are expected to provide China with a competitive advantage in the international market or create jobs. Strategic industries are seen as a growth catalyst for economic development. The state maintains a controlling market share of the pillar industries, while strategic industries are kept 100% in state ownership. Table 2 outlines the differences between strategic, pillar and other industries in the Chinese system.

Table 2. Policy goals on state ownership across sectors

Description	Sectors	Ownership goal
Strategic industries	Defence, power generation and distribution, oil and petrochem, telecom, coal, civil aviation, shipping	Maintaining 100% state ownership or absolute control; increasing state-owned assets in these sectors
Pillar industries	Machinery, auto, IT, construction, steel, base metals, chemicals, land surveying, R&D	Absolute or conditional relative controlling stake; enhancing the influence of state ownership even as the ownership share is reduced where appropriate
Other industries	Trading, investment, medicine, construction materials, agriculture, geological exploration	Maintaining necessary influence by controlling stakes in key companies; in non-key companies state ownership will be clearly reduced

Source: OECD (2010): OECD Economic Surveys: China 2010, OECD Publishing, http://dx.doi.org/10.1787/eco_surveys-chn-2010-en

The choice of strategic and pillar industries evolves in accordance with the economy. Under the 11th FYP, seven strategic industries that were to be maintained in state ownership were listed as defence, power generation and distribution, oil and chemicals, telecommunications, coal, civil aviation and shipping. The 12th FYP emphasized a shift towards high-tech industries; the new strategic industries outlined include renewable energy, energy conservation, and environmental R&D.³⁷

3.3 Bureaucratic System for Managing Industrial Development

An administrative system within the Chinese bureaucracy oversees the use of strategic and pillar industries. However, due to the overlap of regulatory responsibilities between various state institutions, the system is unable to effectively implement policy in line with the state long-term goals. This section presents the limitations of the administrative system relevant to the power sector.

Since 1949, the Chinese state bureaucracy's organization of the power sector as regards short- and long-term strategies has experienced recurrent shifts between centralization and decentralization: a "bureaucratic mess" of overlapping jurisdictions. The dominant agencies managing the power sector are the National Energy Commission (NEC) and the NDRC. As shown in Graph 3, the two coordinate the policy/strategies implemented by the National Energy Administration (NEA).

³⁷Lewis (2011), p. 3.

Graph 3 Administrative system, Chinese energy sector

Source: Downs (2008), p 3.

In addition, the State Electric Regulatory Commission (SERC) and its sub-body the China Electricity Council are responsible for regulating the power industry; and the State-Owned Assets Supervision and Administration Commission (SASAC) is in charge of overseeing/approving all policy decisions involving SOEs. The overlap of administrative responsibilities of these four institutions makes the decision-making process difficult, as institutions often contradict each other.

The NDRC is the executive organ in charge of carrying out the long-term policies developed by the NEC, like the energy-efficiency targets outlined in the 12th FYP. It also conducts its own development strategies within the field of economy and social development, in coordination with the Ministry of Finance and the People's Bank of China, as part of

China's macroeconomic system.³⁸ The NDRC mandate is broad, with responsibilities stretching over a range of industrial, economic and social sectors, including 26 departments, bureaux and offices.³⁹ Some of its sectors are inadequately staffed to enable detailed knowledge concerning sector-specific actors.⁴⁰

The NEC's position as kind of a mini-cabinet that includes leading ministers from governmental organs such as the Ministry of Finance, the NDRC and the Ministry of Foreign Affairs is strong enough for pushing such decisions.⁴¹ However, even though the high political representation seems to provide sufficient power to actually control the involved actors within the energy sub-sectors, the high-level representation of NEC is also a handicap, as it does not convene on a regular basis. In addition, although meant to regulate the energy industry, the NEC was not given jurisdiction over the SOEs in the oil/gas as well as the power sector.⁴² This jurisdiction remained with SASAC, which has severely crippled NEC influence over the main actors in the sector. Thus, NEC should be seen as a bureaucratic organ without the influence, time, manpower or resources necessary for it to take part in the strategic development of energy policy. This task is left to the understaffed NEA, which is subordinate in rank to most of the SOE leaders with vice minister rank in the State Council, and the thinly stretched NDRC.

Also power relations between the actors are relevant to the functionality of the regulation of the SOEs. The chief executive officers of SOEs generally have higher-level contacts in the Party through *guanxi* networks (see next section) than the agencies established to regulate the SOEs. For instance the attempts to restructure the energy sector by establishing the NEC in 2010, the NEA in 2008 or the Leading Energy Group in 2005 failed to deliver the necessary "power clout" to enforce decisions over SOEs. This has been the result of organizational interests by SASAC and the NDRC, keen to maintain their influence and position within the bureaucratic system, as well as of active lobbying by energy

³⁸ For more information, see Xinhua News Agency, Highlights of China's Restructuring Plan, www.china.org.cn/government/NPC_CPPCC_sessions2008/2008-03/16/content_12777266.htm

³⁹ National Development and Reform Commission, Brief Introduction to the NDRC, <http://en.ndrc.gov.cn/brief/default.htm>

⁴⁰ Downs, E. (2008): China's "New" Energy Administration, *China Business Review* Vol. 6, www.chinabusinessreview.com/archive/index_of_articles.html, p. 43.

⁴¹ Most notably, the commission is headed by Premier Wen Jiabao as chairman and Vice Premier Li Keqiang as his deputy.

⁴² Lam, W. (2008): Stability Trumps Reform at China's Parliamentary Session, *The Jamestown Foundation, China Brief* Vol. 8 Issue 6 (14 March) www.jamestown.org/programs/chinabrief/single/?tx_ttnews%5Btt_news%5D=4790&tx_ttnews%5BbackPid%5D=168&no_cache=1

companies seeking to prevent the establishment of an influential ministerial-level agency.⁴³

As a result, the decision-making process has developed into unofficial negotiations between SOE leaders and the CCP. In practice, the officially responsible agencies have little influence on the actual decision-making process concerning most policies involving the strategic and pillar industries. This system not only secures a dominant position for the SOEs in the country's economy, but also makes any policies, such as accepting mitigation measures, dependent on the SOEs' interests and willingness to change.

3.4 The Guanxi Network and Nomenklatura System

The *nomenklatura* system is an important facilitator of policy enforcement amongst industrial actors. The Chinese *nomenklatura* is a list of meaningful positions within the power sphere of the CCP, ranging from university positions and governmental positions (urban and rural) to the CEOs of SOEs. The selection process itself puts an overall focus on the person's past merits, emphasizing party loyalty and performance record.⁴⁴ Since the general managers of SOEs often serve as the Chairmen of the Board within the listed subsidiaries, governmental influence through appointments to higher positions indicates a way for the CCP to maintain control over the SOEs and their subsidiaries. Anyone who ignores the wishes of the party may lose the opportunity to climb the ladder within the inner sphere of the power hierarchy.⁴⁵

In Chinese political and business circles, the networks of *guanxi* are forms of strategic alliances between various actors within industry and the central bureaucracy and the implementation of its policies.⁴⁶ *Guanxi* literally means "relationships" or "connections".⁴⁷ This network facilitates negotiations between the SOEs and CCP when formulating policy,

⁴³ Jiang, J. and J. Sinton (2011): Overseas Investments by Chinese National Oil Companies. International Energy Agency, Information Paper, February 2011, p. 27.

⁴⁴ For more information concerning the appointment process, the following works are recommended: Brodsgaard, K. E. and Z. Yongnian (eds) (2006): *The Chinese Communist Party in Reform*. London: Routledge; Burns, J. (1987): China's Nomenklatura System, *Problems of Communism* Vol. 36, September–October 1987, pp. 36–51; Lieberthal, K. (1995): *Governing China From Revolution Through Reform*. London: Norton, pp. 208–213.

⁴⁵ Downs, Erica (2010): Who's Afraid of China's Oil Companies? Washington DC: Brookings Institution Press, p. 76.

⁴⁶ Ai, Jin (2006): Guanxi Networks in China: Its Importance and Future Trends, *China & World Economy* Vol. 14 No. 5, pp. 105–118.

⁴⁷ It is important to note the current debate on whether the influence of the *guanxi* network on the economy is lessening. This report focuses on the extent of *guanxi* existing between SOE leaders and the CCP cadres and could suggest an unofficial channel for investment approval; assessment of the overall debate on the *guanxi* network's relevance to the economy is beyond its scope. For more on this debate, see Guthrie, D. (1998): The Declining Significance of Guanxi in China's Economic Transition, *The China Quarterly* No. 154, June, pp. 254–282.

as described above. Moreover, *guanxi* relationships function as a bridge between the SOEs and the CCP when initiating policy without the official approval of the State Council or lower level bureaucratic institutions.⁴⁸ This makes the decision-making process more effective and circumvents some of the limitations of the administrative bureaucracy. On the other hand, the *guanxi* network can also work against the interests of the state bureaucracy. Vested interests based on *guanxi* contacts between local administrative officials and industry could prevent the implementation of policies seen as undesirable.

3.5 State-owned Enterprises (SOEs)

In this report we define a SOE as a state-owned company with country-wide operations primarily involving strategic or pillar industry sectors. As the leadership is selected through the nomenklatura system, decision-making processes are rooted in the coordination of policy with the CCP and the central government as well as the financial sector facilitated through the *guanxi* network. As the World Bank (2012, p.21) expressed it:

“SOEs often accept informal guidance from government officials and, in return, state enterprises are more likely to enjoy preferential access to bank finance and other important inputs, privileged access to business opportunities, and even protection against competition.”

Our definition of an SOE is not shared by all scholars, as also companies owned by lower levels of state administration (regional, local) as well as subsidiaries of SOEs are sometimes referred to as SOEs.⁴⁹ We have excluded these because our aim here is to explain the role of the state-level SOEs in charge of activities relevant to China’s emission trends.

Western economic thinking has often deemed SOEs inefficient as economic actors in comparison to private enterprises.⁵⁰ China’s use of selected SOEs in the strategic industrial sectors to promote growth differs from the Schumpeterian assumption of competition as the key to the creative destruction that leads to a dynamic market in constant transformation.⁵¹ For instance the World Bank has emphasized the dangers of negative effects on productivity improvements, innovation

⁴⁸ Interview 2011.

⁴⁹ Lee, M. H. W. (2012): Analyzing the Influence of Major Actors in China’s Renewable Energy Policy Process as a Means of Predicting Future Chinese Renewable Energy Policy Trends. Master’s Thesis, University of Michigan, April 2012, <http://deepblue.lib.umich.edu/bitstream/2027.42/90860/1/MICHLHW%20Masters%20Thesis%20Final%20Copy.pdf>, p. 55.

⁵⁰ See for instance The World Bank (2012a), pp 21–22.

⁵¹ Schumpeter, J. (1942): *Capitalism, Socialism and Democracy*. New York: Harper.

and creativity caused by SOE dominance in key sectors. The support the SOEs receive from the state also leads to a non-level playing field which discourages new private-sector entrants and could thus have negative effects on long-term competition.⁵² However, due to various shortcomings of the institutional system, China's state bureaucracy relies on the SOEs to implement policy in its strategic and pillar industry sectors. The SOEs can therefore be said to be carrying out broader functions for the Chinese state in securing long-term economic growth. This point has been emphasized by Chinese commentators, who have held that China's SOEs should not be judged by Western indicators.⁵³

In strategic and pillar industries, sectorial policy is developed and executed by three types of institutions: 1) the state bureaucracy regulatory agencies (the NDRC and the NEC); 2) SOEs; and 3) the Chinese policy banks (China Development Bank – CDB, Export Import Bank – China Exim Bank and China Investment Corporation). Investment decisions are taken in cooperation between these institutions and the CCP leadership in order to secure the political influence of the state in the market. This coordination binds the SOEs, due to their position within the Chinese power hierarchy i.e. the influence of the *nomenklatura* system and *guan-xi* networks, and addresses the problem with the state institutions' lack of overview of sectors and their limitations in controlling SOEs. However, the SOEs maintain freedom to decide on the direction of investments and the overall administration of the company.

The state initiates a range of policies to ensure that the SOEs acquire a monopoly in the strategic sectors through access to financial resources and licenses to operate certain technologies, like nuclear power. Further, the SOEs are granted authority to implement state policy through channelling private investments on the sector. This is intended to speed up the decision-making process and take a step towards market-driven investment decisions instead of administrative ones. China National Offshore Oil Company (CNOOC) provides an illustration of the benefits of establishing SOEs with allocated authority (Box 1).

⁵² The World Bank (2012a), pp 21–22.

⁵³ Chen, J., W. Czarnecki, E. Di Capua, M. Julien, K. Koo, and D. Zaviyalov (2009): Renewable Energy in China: A Necessity, Not an Alternative. *Knowledge@Wharton*, 20 April 2009, <http://knowledge.wharton.upenn.edu/article.cfm?articleid=2214>; Interviews

BOX 1. CNOOC: Legal institution and international company

In 1982, CNOOC was established as a legal entity intended to facilitate the participation of foreign oil companies in the exploration of China's domestic offshore oil reserves, in addition to contributing to technological transfers and FDI to China's oil sector. Although CNOOC proceeded to become an international oil company, it has maintained its role as a legal institution of the Chinese government until today. CNOOC's allocated authority gave Western firms one specific institution to discuss with, while allowing CNOOC to acquire easy access to new technology transfers and operational expertise.^a Considering that the company is today one of the world's most technological advanced offshore oil exploration companies, its role as a centralized hub for cooperation with foreign companies has undoubtedly been a significant benefit, particularly within areas like the restructuring of the company, the decision-making processes and how to operate in the international market. The success of CNOOC established the basis for Chinese leaders centralizing strategic industries.

^a Lieberthal, K. and M. Oksenberg (1988): *Policy Making in China: Leaders, Structures, and Processes*. Princeton, NJ: Princeton University Press, pp. 123–128.

3.5.1 SOEs and State Policy

The coordination of policy between the Chinese state and SOEs in strategic and pillar industries is a relationship based on mutual interests – or exchange of favours. The strategic industries get the financial and market security needed to develop their infant industries, while in return the state can secure the development of industries of military and/or economic importance. This is done mainly through the provision of either resource-based loans or the availability of investment credit to specific companies.⁵⁴ However, the state gradually loses its former channels of influence with the growth of the strategic industries, achieving a high technological and competitive level, diversified market, and the establishment of a multinational corporate image.

Generally, when policies are unfavourable to SOEs, the decision of whether the SOEs must follow the policy is taken on the basis of discussions between the top CCP leadership and the SOE leadership. In such

⁵⁴ See WAtoday.com.au (2012): China's struggling solar firms defy financial gravity, *WAtoday*, 13 November, www.watoday.com.au/environment/climate-change/chinas-struggling-solar-firms-defy-financial-gravity-20121113-2993k.html; and Dempsey, K. M. (2012): *Request for Comments Concerning China's WTO Compliance*. Washington DC: American Iron and Steel Institute, September 24, p. 16.

cases the official authority, the State Council, is only a rubber stamping body that approves the outcome of such negotiations. An example is the China National Petroleum Corporation's increased investment in Sudan in 2007 even though the NDRC had discouraged further such investments there. The SOEs have also tended to complete overseas acquisitions first, and inform the NDRC and State Council only afterwards. These actions support the assumption of the unofficial agreements made between the SOEs and the CCP leadership through unofficial decision-making processes in the *guanxi* network.⁵⁵

China's national oil companies have been the first to become less dependent on state support as well as on domestic oil and gas reserves, and have actively distanced themselves from the Chinese state. This development could also be expected to occur in other strategic industries as these SOEs gradually become more involved in the international market. Still, the state is able to keep the SOEs in line with its long-term policy objectives through the following three channels of influence it maintains over the strategic industries:

- Most importantly, the *nomenklatura system* is emphasized as SOEs gain more freedom in economic terms. The personal career paths of CEOs still remain dependent on promotion through the *nomenklatura*, which in turn provides the CCP a way to punish CEOs who do not stay in line with state policy.
- An official factor to put pressure on SOEs is the government's *investment approval system*. Domestic investments within the energy industry need the approval of the State Council. Foreign investments that exceed USD 30 million must be approved by the NDRC, whereas investments in excess of USD 200 million must be reviewed by the NDRC and further approved by the State Council.⁵⁶
- Further, the *CCP also has an influential position through the credit control* it exerts on industries. Even though SOEs have been generating sufficient revenue to distance themselves from state funds, the three state-owned banks (China Exim Bank), CDB and the Agricultural Bank) can still offer loans with concessionary terms of interest to SOEs, and this can help to ensure that they will follow the wishes of the CCP.

⁵⁵ Downs (2008), pp. 42–43.

⁵⁶ With the establishment of the NEC, the NDRC was instructed to minimize its involvement in the investment approval system. However, as the NEC was established only recently, it is difficult to determine the extent to which this is in fact the case. Downs, E. (2010): *Business Interest Groups in Chinese Politics: The Case of the Oil Companies*. Washington DC: Brookings Institution Press, p. 121.

3.6 Choice of Case Studies: Steel and Power Sectors

The steel and power sectors chosen as case studies here are pillar and strategic industries. Their different statuses are reflected by the state's different objectives as regards the sectors. The steel sector is a pillar industry, so the objective of the structuration of the sector is to acquire sufficient SOEs control to enable effective implementation of policy.⁵⁷ The power sector is a strategic sector, so the state policy here involves supporting a selected number of SOEs in each industry to acquire complete control over the sector. This is reflected in each sub-sector of power generation. Coal-fired power generation, hydropower, the oil, gas and nuclear sectors are almost totally dominated by SOEs.⁵⁸ Emerging strategic industries, such as renewables, were accorded strategic industry status in the 12th FYP and currently have some private ownership as well.⁵⁹ This seems likely to change as SOEs merge with private enterprises in the renewable energy sector.⁶⁰

Our case studies in Sections 4 and 5 present examples of the roles and tasks of SOEs depending on the characteristics of the (sub-)sector and political goals pursued by the central bureaucracy. Further, they illustrate the state's methods of promoting SOEs while facilitating the closure of inefficient private firms by restrictions on investment credits.

⁵⁷ Why the Chinese state deems it necessary to have SOE monopoly in a sector to implement policy is discussed in the case studies.

⁵⁸ In 2002, the Chinese government split up the monopoly State Power Corporation (SPC) into separate generation, transmission, and services units. Since the reform, China's electricity generation sector has been dominated by five state-owned holding companies: China Huaneng Group, China Datang Group, China Huan-dian, Guodian Power, and China Power Investment. These generate about half of China's electricity. Much of the remainder comes from local or regional generation, also referred to as independent power producers (IPPs), often in partnership with the privately-listed arms of the state-owned companies. See EIA (2012): China, an analysis brief, www.eia.gov/countries/cab.cfm?fips=CH

⁵⁹ The World Bank (2012b): Supporting Report 2: China's Growth through Technological Convergence and Innovation, p. 176.

⁶⁰ Interview 2012.

4. Case Study: Electricity Sector

4.1 Structure and Actors

Since China opened and reformed its economy in the 1980s, the electricity industry has experienced rapid expansion. From 1978 to 2009, power-generation capacity grew from 57 GW to 874 GW and output from 257 billion Twh to 3,664 billion Twh.⁶¹ The sector is not only the backbone of China's economic modernization: it is also responsible for about half of the country's CO₂ emissions.⁶² The IEA has estimated that in 2008 SOEs controlled 57% of power-generation capacity, and emitted 1.4 Gt CO₂e.⁶³

As shown in Graph 4, China's power capacity is dominated by the combustion of *coal*, which accounts for over two-thirds of the total.⁶⁴ High in carbon content, coal combustion accounted for some 97% of the GHG emissions from the power sector and about half of China's total CO₂ emissions in 2009. Coal-fired power generation is controlled by five large SOEs⁶⁵ overall while small local generators, mostly owned by provincial and local governments but also by private and foreign investors, dominate activities at the local level. In the middle of the last decade, these generators accounted for over a half of total capacity,⁶⁶ while the State Electricity Regulatory Commission reported the share of local small generators⁶⁷ to be just below 30% in 2010.⁶⁸

⁶¹ Cheung, K. (2011): Integration of Renewables: Status and Challenges in China, a working paper, www.iea.org/publications/freepublications/publication/name,3962,en.html, p 8.

⁶² IEA (International Energy Agency) (2011a): *World Energy Outlook 2011*, p 594.

⁶³ Baron, R., A. Aasrud, J. Sinton, N. Campbell, K. Jiang and X. Zhuang (2012): Designing an Emissions Trading System for China's Electricity Sector. Paris: OECD/IEA, p. 8.

⁶⁴ Hong, S., A. Cosbey, and M. Savage (2009): *China's Electrical Power Sector, Environmental Protection and Sustainable Trade*. Winnipeg, Manitoba, Canada: International Institute for Sustainable Development (IISD), p. 14.

⁶⁵ China Huaneng Group, China Power Investment Corporation, China Guodian Corporation, China Datang Corporation and Shenghua group.

⁶⁶ Sun (2010) reports that coal-fired generation units smaller than 300 MW accounted for 53% of total capacity (Sun, G. (2010): *Coal in China: Resources, Uses and Advanced Coal Technologies*. Coal Initiative Reports, White Paper Series. Washington DC: Pew Center on Global Climate Change); in 2006 the IEA estimated that small locally owned generators accounted for over a half of total capacity (IEA (2006): China's Power Sector Reform. Where to Next? at www.iea.org/publications/freepublications/publication/chinapower.pdf, p. 33.

⁶⁷ Both private and state-owned, which probably accounts also for regional and local government ownership.

⁶⁸ As cited in Wang, Q. and X. Chen (2012). China's Electricity Market-oriented Reform: From an Absolute to a Relative Monopoly. *Energy Policy* Vol. 51, pp. 143–148, at p. 146.

Graph 4. Power-generation capacity, 2009 (GW)

Source IEA (2011a): World Energy Outlook 2011 © OECD/IEA 2011, p. 594.

Graph 5. Estimated power-generation Capacity, 2035 (GW)

Source IEA (2011a): World Energy Outlook 2011 © OECD/IEA 2011, p. 594.

Natural gas accounts for only about 3.5% of China's generation capacity at present; however, it is seen as a future source of energy for fuelling electricity generation. As reflected in Graph 5, gas-fired power capacity

is estimated to increase from 15 to 204 GW by 2035. This is a significant push, but the IEA estimates date back to 2011, before many of the major developments outlined below – so the share of gas could increase even more rapidly.⁶⁹ The main actors can be identified across the gas and oil sectors; oil-sector SOEs are both extracting gas and operating the import of (Turkmen and Russian) gas by pipeline (China National Petroleum Corporation – CNPC) and by LNG (CNOOC). In October 2011, a target was set to introduce 5 GW gas-fired capacity by 2015 and 50 GW by 2020. The planned increase in gas-fired power production to replace the use of coal in densely populated areas has been allocated to four SOEs: CNOOC, Huadian Group, Beijing Gas and CNPC.⁷⁰ Private companies are developing the extraction of unconventional shale gas.

In 2009, China's *nuclear* power plants generated 70134 TWh – about 1.89% of total power supply⁷¹ – from 16 nuclear power reactors. The industry was estimated to reach an installed capacity of 71 GW by 2020 from 9 GW in 2009, but the estimates were revised after the Fukushima nuclear accident. The ownership and operation of nuclear power plants is centralized in the hands of three SOEs: the China National Nuclear Corporation, China Guangdong Nuclear Power Group and China Power Investment Corporation.

China is the world's leading *hydropower* producer. In 2009, China's hydro-capacity was about 197 GW – 20% of total capacity – and the IEA estimates that by 2020 it will reach approx. 330 GW, representing an annual increase of around 16.5 GW.⁷² Large hydropower generation is completely centralized under SOEs.⁷³

The 12th FYP highlighted the *renewable* power industries as one of the country's new strategic industries. This has significant implications, as strategic industries enjoy strong financial and political support. According to IEA estimates, wind power is expected to account for the most significant capacity growth among the renewable industries. Based on Chinese plans, IEA estimates wind-power capacity to reach 280 GW by 2030.⁷⁴ The objective is that by 2050 wind power will cover 17% of total demand.⁷⁵ As to photo-voltaics (PV) China's installed capacity was

⁶⁹ Interviews 2012.

⁷⁰ Kerr, O. (2012): Full Steam Ahead? Urban China Initiative, p 15, www.urbanchinainitiative.org/wp-content/uploads/2012/10/UCI-Column-Gas-fired-distributed-energy-in-China.pdf

⁷¹ IEA (International Energy Agency) (2009): Electricity/Heat in China, People's Republic of in 2009, http://www.iea.org/stats/electricitydata.asp?COUNTRY_CODE=CN

⁷² Cheung (2011). p. 17.

⁷³ The biggest hydro-specific SOEs in terms of capacity are the China Three Gorges Cooperation, China Huaneng Group, China Power Investment Corporation, China Guodian Corporation and China Datang Corporation.

⁷⁴ IEA (2011a), p. 594.

⁷⁵ IEA (International Energy Agency) (2011b): Technology Roadmap: China Wind Energy Development Roadmap 2050, www.iea.org/publications/freepublications/publication/name,27325,en.html, p. 7.

ca. 3.3 GW in 2011.⁷⁶ These new sub-sectors of power generation have been made possible by generous state subsidies. Wind generation is controlled by SOEs while PV capacity is partly privately owned.

China's *power grid* is divided between seven regional grids. Poor interconnections between grids cause problems, as about 75% of electricity is consumed in the eastern and central parts of the country, while 80% of hydropower capacity is located in western China and 80% of China's coal reserves are located in the northern and western regions.⁷⁷ SOEs operate the power grid.

4.2 Examples of the Role of SOEs in Climate-relevant Activities

Given China's abundance of domestic reserves, coal is set to remain the leading fuel for electricity generation for the foreseeable future. Together with estimated growth in the share of gas, electricity production will continue to be dominated by fossil fuels. Thus, climate mitigation actions in the sector must include not only switching from coal to zero-carbon sources (renewables and nuclear), or to the less carbon-intensive fossil fuel gas, but also major efforts to improve the efficiency of coal combustion. Significant modernization within the power sector is thus necessary. This is emphasized in both the 11th and 12th FYPs. The 11th FYP established an energy-intensity reduction target of 20%, with policy measures that apply to the power sector: the small plants closure programme, energy-efficiency standards and the Top-1.000 Enterprises programme. Power-sector facilities accounted for some 20% of the total energy consumption of the Top-1000 enterprises in 2006.⁷⁸

The central government – which plans mitigation policies – and its regulatory authorities have varying levels of control over different sub-sectors of electricity industries, depending on the sector's share of private enterprises and how high the level of political contacts enjoyed by the company leadership. This section outlines examples of the varying roles of SOEs in the sub-sectors and their relevance to future emissions dynamics.

⁷⁶ Jager-Waldau, A. (2012). *PV Status Report 2012*. European Commissions JRC Scientific and Policy Report EUR 25749 – 2012. Ispra, Italy: European Commission, Joint Research Centre, Institute for Energy and Transport, p. 15.

⁷⁷ IPA (2010). Power transmission & distribution in China. June 2010, p. 17, www.gmp.uk.com/publications/June2010/ipa/IPA-June-2010.pdf

⁷⁸ Price *et al.* (2008), p. 13.

4.2.1 Coal-fired Power Generation: Towards Centralization

Power production has traditionally been managed locally. As a stable and cheap source of power, small coal-fired power producers, mainly owned by local or provincial administrations but also by private and foreign investors, have dominated rural power supply to local industries. The central bureaucracy aims at closing down parts of this inefficient, locally owned small-sized generation capacity, and replacing it with more efficient centralized generation by SOEs.

The 11th FYP's small plant closure programme (2006–2010) focused on closing various types of obsolete units,⁷⁹ and successfully closed 72.1 GW of such small-scale locally owned sub-critical capacity. However, the central bureaucracy encountered enforcement problems with the local governments. Regardless of the assessment of the performance of local government officials based on the efficiency improvements in the county's power sector (the Energy and Conservation Law), maintaining local economic growth overrides as a prioritized policy goal. As a result, local officials can justify ignoring the law, should economic growth be threatened. This excuse is often taken advantage of due to *guanxi*-related vested interests: local officials may have investments and/or personal relations with plant owners inclining them to postpone closure. There is also a material rationale to the reluctance. Due to the constrained transmission capacity between grids, increased power consumption often results in regional power shortages, which makes local generation important.

One of the ways to cut the energy and carbon intensities of the economy is to limit the use of sub-critical coal plants.⁸⁰ In 2007, about 11.5% of all coal-fired power-generating technology in China was super-critical or ultra-supercritical (USC), while inefficient sub-critical capacity accounted for the rest.⁸¹ The closures of sub-critical plants during the 11th FYP represented the equivalent of 16% of the total capacity commissioned during the period. However, as much as 31% of the *new* coal-fired capacity in 2010 was also sub-critical.⁸² This mismatch can be explained largely by the higher capital costs of the more modern plant types; in the case of USC

⁷⁹ Conventional thermal power generating units of below 50 MW; conventional thermal power-generating units of 100 MW and below that have been operating for over 20 years; conventional thermal power-generating units of 200 MW and below that have reached the end of their design lives; coal-fired generating units with a net heat rate at least 10% higher than the 2005 provincial average or at least 15% higher than the 2005 national average; generating units that fail to meet environmental standards; and generating units not in compliance with laws and regulations.

⁸⁰ Ultra-supercritical technology delivers an efficiency rate above ca. 43% while the rate for sub-critical capacity is in the range of 30 to 36%. Seaman, J. (2012): China and Cleaner Coal. A Marriage of Necessity Destined for Failure? *Asia Visions* Vol. 52, Center for Asian Studies, p. 14.

⁸¹ IEA (International Energy Agency) (2009b). Cleaner Coal in China, www.iea.org/publications/freepublications/publication/name,3804,en.html, p. 101.

⁸² IEA (2011a), p. 369.

some 13% higher than that of sub-critical.⁸³ Locally owned smaller companies can seldom afford to invest in such technology.

Graph 6. New additions of coal-fired generation capacity, by technology and region in the New Policies Scenario

*Includes ultra-supercritical and IGCC.
Note: Excludes coal-fired generation from CHP plants.

Source: IEA 2011a, World Energy Outlook 2011 © OECD/IEA 2011, figure 10.9, p. 366.

As shown in Graph 6, the IEA expects sub-critical capacity to continue to have an important role in China's coal-fired electricity sector, as it is projected to account for roughly one quarter of new capacity until 2020. However, the centralization of coal-fired power generation to larger more efficient units could have a significant mitigation impact if successful; the combustion efficiency of super-critical is 13 to 36% and USC (referred to as "advanced" in Graph 6) 19 to 43% higher in comparison to sub-critical capacity, which accounted for 88.5% of total coal-fired electricity generation capacity in China in 2007.⁸⁴

These two related examples from the coal-fired power sector illustrate the problems with the current control structure in terms of policy enforcement, and partly explain the central bureaucracy's rationale for centralization. By centralizing generation under SOEs, the aim is to replace sub-critical coal-fired power capacity and to reverse the trends of commissioning new sub-critical capacity that goes against the energy-efficiency goals. While the *guanxi* contacts of SOEs with the CCP could further enforce policy implementation, local actors may be more loyal to the interests of their local *guanxi* networks. Indeed, in the absence of improved grid connections, the centralization of coal-fired power gener-

⁸³ IEA (2009b), p. 103.

⁸⁴ Seaman (2012), p. 14; IEA (2009b), p. 101.

ation could be risky for the local economic actors. At the same time, however, it could deliver economics of scale, improve control over the implementation of obsolete capacity closures, and limit the commissioning of – and lock-in to – new sub-critical generation capacity. Thus, SOEs could play an important role, in terms of facilitating a better power grid as well as more modern, and thus efficient, power-generation capacity.

4.2.2 Gas: Promise for the Future

Even though the high international market price on LNG has favoured coal over gas as a power source, with gas imports from Central Asia and Russia and the commercialization of shale-gas production in the USA, estimates on future gas prices in East Asia are changing. China has currently five LNG import terminals, with an additional nine terminals under development, making it one of the world's largest LNG market in terms of import capacity. As a result, the prospects for natural gas as a future source of power have changed dramatically in recent years. The new technological opportunities for utilizing shale gas add to this: the world's second largest reserves of unconventional shale gas are located in China. Although utilizing these reserves will take time due to technological challenges, in the longer term, potential production could make China self-sufficient in gas.

The way the central bureaucracy has tasked the SOEs with investing in LNG capacity at a fast pace provides an example how SOEs can facilitate early start on infrastructure development prior to favourable market conditions or support infrastructure (i.e. demand by existing large scale gas-fired electricity generation capacity) would allow it. Such gas-consuming capacity is being built simultaneously by other SOEs. Here the economic interests of the SOEs are probably in line with the longer-term interests of the central bureaucracy. Beyond that, the financial support by the central bureaucracy to the SOEs regardless of short/medium-term losses facilitates early action.

From climate perspective, the increasing share of natural gas in China's power balance is certainly a positive development; GHG emissions of combusting conventional gas are about 44.5% lower than emissions from coal combustion in power generation.⁸⁵ However, as regards the environmental impacts of shale gas, the jury is still out. Due to the leak-

⁸⁵ EIA (U.S. Energy Information Administration) Voluntary Reporting of Greenhouse Gases Program Fuel Carbon Dioxide Emission Coefficients, www.eia.gov/oiaf/1605/coefficients.html

ages of gas (methane) during extraction, emission estimates range from some 60% of the emissions of coal to the equivalent, or even higher.⁸⁶

4.2.3 Nuclear and Hydro: Centralized, but Limited by Social Dynamics

In 2007, the Chinese government decided to allow only three SOEs to operate and own nuclear facilities, in order to improve top-down policy implementation.⁸⁷ Although major power-generating companies, including Huaneng, Huadian, Datang and Guodian, had already established nuclear subsidiaries and/or were participating in nuclear projects, their involvement was rejected. This approach on the part of the Chinese leadership suggests that enhancing technological competitiveness is considered easier to achieve when limited to a small number of companies.⁸⁸ Limiting the operations of nuclear power to only three SOEs would also fit the pattern of a decision-making process influenced by *guanxi* contacts.

It is clear that, although China intends to pursue its expansion of nuclear capacity, the Fukushima accident underscored the dangers of nuclear power. Especially after the Chinese bullet-train crash in July 2011, Chinese leadership has registered public dissatisfaction with prioritizing development and profit over safety concerns.⁸⁹ This has slowed the development of the sector, as reflected by the changes in capacity estimates between 2009 and 2011, and thus limited the potential of the selected SOEs to increase the share of nuclear power in the country's electricity balance.

The hydropower sector has experienced a steady growth in capacity as well as technological capabilities; moreover, significant potential (some 80% of the total) remains still unused.⁹⁰ Large hydro is controlled by SOEs, which facilitates the implementation of mega-projects with significant social consequences. However, China's hydro-capacity targets may well change, as the estimated expansion would represent about

⁸⁶ Howarth, R., R. Santoro and A. Ingraffea (2011): Methane and the Greenhouse-gas Footprint of Natural Gas from Shale Formations, *Climatic Change* Vol. 106, Issue 4, pp 679–690; Hultman, N., D. Rebois, M. Scholten and C. Ramig (2011): The Greenhouse Impact of Unconventional Gas for Electricity Generation. *Environmental Research Letters* Vol. 6, No. 4, 049504, 1pp; Cathles, L. M. (2012): Assessing the Greenhouse Impact of Natural Gas. *Geochem. Geophys. Geosyst.*, Vol. 13, Issue 6, doi:10.1029/2012GC004032; O'Sullivan, F. and S. Paltsev (2012): Shale Gas Production: Potential versus Actual Greenhouse Gas Emissions. *Environmental Research Letters* Vol. 7, No. 4, 044030.

⁸⁷ Interview 2012.

⁸⁸ A clear illustration is the recently awarded contract to CNNC to build five new nuclear reactors in the UK.

⁸⁹ *BBC News China* (28 December 2011): China Bullet Train Crash "Caused by Design Flaws", www.bbc.co.uk/news/world-asia-china-16345592; and Interview 2011.

⁹⁰ IEA (International Energy Agency) (2010): Renewable Energy Essentials: Hydropower, http://iea.org/publications/freepublications/publication/Hydropower_Essentials-1.pdf

seven Three Gorges hydropower projects. In given of the controversies surrounding the development of the Three Gorges Dam, the central government has become aware of how relocating millions of people, changing river flows, and damaging the local environment as well as agricultural and shipping industries impacts on its public support.⁹¹

Social dynamics related to risks with large energy projects are becoming more relevant in China as civil society gains political influence. The nuclear and hydro sectors provide examples of social dynamics which emplace serious limits on the potential of SOEs to develop low-carbon electricity generation facilities. Implementation of the maximum plans on the nuclear and hydro sectors would have a major impact on global GHG emissions. If the plans as presented in Graph 5 are fulfilled by 2030, hydro and nuclear could make 23% of China's total power generation carbon-free.

4.2.4 Wind and PV: SOE Role in Launching "New Industries"

The 12th FYP highlighted the renewable power industries as "strategic." This has significant implications, given the strong financial and political support such industries enjoy. These new industries also provide examples of applying various approaches to ownership and control.

The wind-power sector shows the dominance of SOEs. As of mid-2012, China's installed wind-power capacity was 67.7 GW, which accounts for ca. 27% of global capacity. SOEs control the sector, in generation and in equipment manufacturing, after the massive investments Beijing has made in the sector through an SOE structure since 2003.⁹² This, together with feed-in tariffs, has paid off in terms of China's global role in the sector: the increase in capacity has been rapid, and China has established itself as the world's leading manufacturer of wind turbines (43% in 2011).⁹³ This is a typical goal the CCP sets to strategic industry sectors.

Photovoltaic (PV) generation capacity as well as technology manufacturing is mostly privately controlled in China. Still, its rapid increase is due to state financial support. The strategy of abundant public funding has its risks, however. A financial effort similar to that for the wind-

⁹¹ Stanway, D. (2011): Analysis: China's Push for More Hydropower Tests Limits. *Reuters*, www.reuters.com/article/2011/07/12/us-china-hydropower-idUSTRE76B1LA20110712; *Reuters* (17 January 2012): China Urges Hydropower Developers to Heed Environment, www.reuters.com/article/2012/01/17/china-hydropower-idUSL3E8CH2AC20120117

⁹² Buen, J. and P. Castro (2012): How Brazil and China have Financed Industry Development and Energy Security Initiatives that Support Mitigation Objectives, Ch. 3 in A. Michaelowa (ed.) *Carbon Markets or Climate Finance? Low Carbon and Adaptation Investment Choices for the Developing World*. Routledge, pp. 53–91.

⁹³ The World Wind Energy Association (2012): 2012 Half Year Report, www.wwindea.org/webimages/Half-year_report_2012.pdf, p. 1.

power industry was launched in order to achieve dominance of the global market. In 2011, China was the world's largest producer of solar panels (ca. 53%), whereas installed PV capacity was ca. 3.3 GW.⁹⁴ With a decreasing export market as a result of the global economic crisis and US trade action to level the playing field for domestic PV companies against the state subsidies in China, the Chinese PV manufacturing industry is currently supported by state subsidies and the domestic market demand for this technology. According to our interviewees, centralization of the financially troubled PV capacity is under discussion. In December 2012, the state council decided to promote consolidation of the sector, to tackle overcapacity and excessive dependence on foreign markets. The plan is to reduce government support, and also ban local governments from supporting failing but locally important solar producers. Independent solar power generators have also been given the green light.⁹⁵

The possibilities of maintaining the production of high-technology products in a slumping market are due largely to the position of renewable energy as a strategic industry. In line with China's state capitalism, short-term losses are deemed acceptable to keep these industries technologically competitive until the market can utilize their full production capacity. However, also the merits of private control over the PV sector are recognized.⁹⁶

Financial considerations aside, it is clear that without an improved power grid to facilitate the transmission of electricity from the remote areas where China's wind and PV potentials are located, the country's renewable power industries will have difficulties in achieving their full production potential. Beyond the choice between SOE or private ownership, the efforts of the state-owned grid companies are thus the key to the success of renewable energy sources.

4.2.5 A Better Power Grid: Vehicle for Centralization

The weakness of interconnections in the national power grid emplaces material limits on centralization policies. Decommissioning local power generation can lead to power shortages if it makes local actors reliant on power generated in distant centralized units, as per the central bureaucracy's plan. Further, utilization of the often remotely located renewable energy capacity requires a modern grid. As of the beginning of 2011,

⁹⁴ Jager-Waldau (2012), p. 15.

⁹⁵ *The Wall Street Journal* (19 December 2012): China to Promote Mergers in Solar Sector, http://online.wsj.com/article/SB10001424127887324461604578188982352694920.html?mod=WSJ_latestheadlines

⁹⁶ Interviews 2012.

China's installed wind-power capacity was over 40 GW, with 30 GW capacity connected to the grid.

The inadequacies of the power system are being remedied through improvements of interconnected grid transmission and overall grid capacity.⁹⁷ A total of 341 billion Rmb was invested in 2010 in addition to the 2.55 trillion Rmb budgeted by the SOEs to spend by 2015 to improve and expand the power system.⁹⁸ This national mega-project has been allocated to selected SOEs.

Better interconnections between regional grids could facilitate a higher share of renewables in the national power balance, while also easing pressures on capacity-strained motorized transport of coal. In addition, the improvement of interconnected grid transmission would contribute to removing the need for local supplementary power sources.⁹⁹ Thus, grid improvements are the key to a whole range of significant low-carbon developments in the Chinese power sector. What remains to be seen is how effectively and quickly the SOEs can perform their task, thereby promoting low-carbon trends in the economy.

4.3 Summary

This section has shed light on the dynamics of control in the Chinese electricity sector, and how the centralization of power generation under SOEs is used to promote policy goals. With the power-generation sector, many of these go hand in hand with global climate goals.

The coal-fired power-generation sector is undergoing centralization towards the dominance of SOEs to improve efficiency and predictability in policy implementation. The gas sector provides examples of the role of SOEs in large infrastructure projects, like LNG and gas pipelines. The nuclear and hydro sectors exemplify the policy of keeping control over important sources of power close to the central bureaucracy. In any case, they still have to take into consideration the social dynamics of the choices of power sources. Finally, the renewable energy sectors – wind and PV – have matured. PV has developed under competition between small private companies of state funds, whereas wind generation was centralized under SOEs from the beginning. The vital upgrading of the national power grid in the hands of SOEs could facilitate centralization-

⁹⁷ EIA 2012.

⁹⁸ Qu, Dian (2011): China Resumes Investments in Power Grid with a Vengeance. *Trusted Sources*, www.trustedsources.co.uk/china/infrastructure-industry/china-resumes-investment-in-power-grid-with-a-vengeance

⁹⁹ Kahri, F., J. Williams, D. Jianhua and H. Junfeng (2011): Challenges to China's Transition to a Low Carbon Electricity System. *Energy Policy* No. 7, pp. 4032–4041.

related efficiency improvements as well as the expansion of renewable sources of energy in the national power balance.

Global trends can open new opportunities while also lessening the potential of previously identified ones related to the various sub-sectors in terms of mitigation. LNG provides an example of the former. Thanks to new technology, gas-fired power production has become a cost-effective, green alternative to oil and coal-fired power production, and China has harnessed SOEs to proceed with LNG capacity at a rapid pace.

The Fukushima nuclear power accident is an example of the latter case, as it made clear the dangers of setting development and profit over safety concerns. For China, this has led to significant down-scaling of its planned nuclear expansion. The plan had been to increase nuclear capacity by 70 to 80 GW by 2020 and 200 GW by 2030. Due to the Fukushima accident, all approvals and ongoing construction of plants were brought to a halt pending safety inspections. As a result, the target for 2020 was adjusted to 71 GW and 110 GW by 2030, cutting the estimates in half.¹⁰⁰

Many of these larger trends on the power sector involve SOEs, but the actions can hardly be described as mitigation PAMs. At the same time, it would be easy to identify PAMs that would constitute more detailed NAMAs than China has pledged so far – like energy efficiency standards, feed-in tariffs for renewable energy etc. SOEs have an important role in implementing these PAMs.

¹⁰⁰ See IEA (2011a), p 594.

5. Case Study: Iron and Steel Sector

5.1 Structure and Actors

Since the 1980s and the opening up of the economy, China's iron and steel sector has grown exponentially. Today, it is the largest in the world. In 2010, China produced over 622 Mt of steel, representing 44% of total world output. With continuous investments in infrastructure, buildings and machinery, the country's share of global demand is expected to rise from 17% in 2005 to 26% by 2030.¹⁰¹ However, the steel sector is also a major emitter of GHGs. In 2010, China was responsible for about half of the world's steelmaking CO₂ emissions.¹⁰² According to IEA, this was equivalent to 911 MtCO₂ in 2009.¹⁰³

Under the 11th FYP, various mitigation-relevant policy measures applied to the sector, including production-efficiency targets (coal consumption per ton of steel from 741 kg to 619 kg) and targets for decommissioning outdated capacities (111.7 m tons iron casting and 66.8 m tons of steel smelting capacity).¹⁰⁴ Of the energy-efficiency specific measures, the Top-1000 Programme can be mentioned; more than one quarter of the participants in the Programme came from the steel sector, and accounted for over a third of the energy consumption of the companies involved. The energy consumption of these steel-sector participants did not grow during 2004–2006, and was estimated to have saved 7 Mtce or 3.1% of consumption.¹⁰⁵

Beyond the energy and carbon-intensity targets, the main mitigation-relevant policies outlined in the 12th FYP involve a combination of new technological standards for steel production (also low-carbon steel production is mentioned),¹⁰⁶ the relocation of industry from inland to

¹⁰¹ Turner, M. (2011): Mitigating Iron and Steel Emissions. The GNCS Factsheets, Columbia Climate Center, <http://dev.thegnccs.org/sitefiles/file/factsheets/GNCS%20Iron%26Steel.pdf>

¹⁰² Turner (2011).

¹⁰³ IEA (International Energy Agency) (2013): Beyond 2020 database, commercially available at <http://data.iea.org/ieastore/default.asp>

¹⁰⁴ BOC International (1 February 2012): 2012 Steel Industry Outlook. Bank of China's Investment Banking Group, p. 64.

¹⁰⁵ Price *et al.* 2008, pp. 5, 13.

¹⁰⁶ BOC International (2012), p. 28.

coastal areas, and centralizing the sector by limiting access to investment credit for small-sized steel producers.

Like the coal-fired sector, the steel sector suffers from decentralization. In 2012, about 70% of China's steel was low-value steel from small- and medium-sized producers.¹⁰⁷ The exact number of the small-sized producers is unknown; the *Wall Street Journal* has estimated it at between 600 and 800, accounting for as much as 46% of world steel output.¹⁰⁸ In 2008, China's top ten steel producers accounted for less than 50% of national crude steel output.¹⁰⁹ As can be seen from Graph 7, the highest production output is located northeast in Hebei province and in Inner Mongolia.

5.2 Examples of the Role of SOEs in Climate-relevant Activities

Since the establishment of the steel sector as a pillar industry in the 11th FYP, the Chinese government has been pushing through a gradual centralization of the steel and iron sector to strengthen the monopoly of selected SOEs. In July 2005 the NDRC issued a formal policy to centralize the steel production within the top ten SOEs. However, the target of concentrating the capacity was not met under the 11th FYP.¹¹⁰ The State Council returned to this matter in June 2010, with a policy of increasing the share of production of the top ten SOEs from 48% in 2010 to 60% by 2015. This policy has three main objectives: to promote high-quality steel products; to limit the over-capacity of low-value steel production by private actors; and to develop the international market competitiveness of SOEs.¹¹¹ Consolidating the production of steel to a selected number of SOEs aims at supporting the growth of China's emerging high-tech industries – like renewable energy, wind farms, hydroelectric power production, the shipping industry and the automobile industry – which require high-quality steel products. The restructuring of the steel sector is not only an illustration of the rationale of centralizing pillar industries, but also singles out several relevant outcomes to climate mitigation:

¹⁰⁷ *BOC International* (2012), p. 27.

¹⁰⁸ *The Wall Street Journal* (27 November 2012): Global Steel Industry Faces Capacity Glut, <http://online.wsj.com/article/SB10001424127887324595904578116761144046732.html?KEYWORDS=News+QuoteGlobal+Steel+Industry+Faces+Capacity+Glut>

¹⁰⁹ Holloway, J., I. Roberts and A. Rush (2010): China's Steel Industry. Bulletin, December Quarterly 2010, www.rba.gov.au/publications/bulletin/2010/dec/pdf/bu-1210-3.pdf, p. 20.

¹¹⁰ Holloway, Roberts and Rush (2010). pp. 20–21.

¹¹¹ KPMG China (2011): China's 12th Five-Year Plan: Iron and Steel, www.kpmg.com/CN/en/IssuesAndInsights/ArticlesPublications/Documents/China-12th-Five-Year-Plan-Iron-Steel-201105-2.pdf, p. 1.

improving products and technologies, use of better iron ore, and relocation of the industry.

Graph 7 Crude steel production per province, 2009

Source: Holloway, Roberts and Rush (2010).

5.2.1 Improving Products and Technology

The dynamics of demand for steel are changing as the share of high-quality steel products is increasing. The construction industry consumes about half of the steel produced in the less-advanced format of “long” products. Chinese demand for the higher-quality “flat” steel products comes from high-tech industries like renewable energy, wind farms, hydroelectric power production, the shipping industry and the automobile industry. This trend is favourable from a climate perspective, as it promotes more efficient, low-emitting technologies; however, the continuing construction of cities as a result of the ongoing urbanization of the population will generate demand for lower-quality products also in the future. This is reflected in the level of technology used in the steel sector. Compared to OECD countries, China’s steel sector utilizes energy

inefficiently, because of its obsolete technology. In 2008, China used on average about 70% more energy per value of steel produced than the world efficiency leader Japan.¹¹²

There are two methods of producing crude steel: directly from the iron ore or through coking coal by using the blast furnace/basic oxygen converter method (BOF); or by the electric arc furnace (EAF) method that uses scrap metal. Having little scrap metal available, China is dependent on the former method. In 2010, about 90% of its steelmaking plants used the BOF method.¹¹³ In comparison, in the USA and Western Europe, BOF accounts between half and two-thirds of production.

Significant mitigation benefits can be achieved by switching to the BOF method. Chinese steel production is forecast to reach 750 million tons in 2030, and EAF to account for 240 million tons i.e. 30% of the total. The related reduction in GHG emissions would be some 200 Mt CO₂.¹¹⁴ However, in the shorter term China remains dependent on improving the technological standard of its BOF method.

The dominance of small mills in the production of low-quality steel products means the continuation of inefficient practices. The BOF method used in these mills is of low technological standard. Per ton of steel produced, the technology used consumes about 1.7 tons of iron ore or around a half a ton of coking coal.¹¹⁵ The utilization rate of blast-furnace gas as fuel in the BOF method in China is on average 85%. Due to the additional costs of equipment, small mills do not use the emitted furnace gas in power co-generation – and so, by releasing the gas, these mills contribute to even higher emissions.¹¹⁶ Based on 2005 data, the IEA has identified blast furnace use as accounting for roughly three-quarters of the GHG emission reduction potential of the Chinese steel sector.¹¹⁷ If 95% of the blast furnace gas were utilized, China could reduce its steel-making emissions by some 230 MtCO₂ by 2030.¹¹⁸

The 12th FYP set several technological requirements for defining which small plants should be closed down.¹¹⁹ In addition, the state has

¹¹² Boqiang, L., Ya Wu and Li Zhang (2009). Estimates of the Potential for Energy Conservation in the Chinese Steel Industry. *Energy Policy* Vol. 39, pp. 3680–3689, at p. 3682.

¹¹³ Holloway, Roberts and Rush (2010), p. 21.

¹¹⁴ McKinsey&Company (2009), p. 40.

¹¹⁵ Holloway, Roberts and Rush (2010), p. 21.

¹¹⁶ McKinsey&Company (2009), p. 87.

¹¹⁷ IEA (International Energy Agency) (2008): *Energy Technology Perspectives 2008*, p. 485.

¹¹⁸ Turner (2011).

¹¹⁹ Blast furnaces less than 400m³; converters less than 30 tons, electric arc furnace less than 30 tons, hot-rolled strip width below 1,450 mm; annual capacity of hot-dipped galvanized coil below 300,000 tons; annual capacity of colour-coated sheet below 200,000 tons. Source: KPMG China (2011).

emphasized specific standards in the BOF production method, implementing a range of carbon-reduction technologies.¹²⁰

As the technology required for compliance with the new standards is costly, small steel mills are unlikely to be able to follow state requirements – especially in the absence of investment credit, which the Chinese state has limited in order to enforce its centralization policy.¹²¹ Thus, increased use of these technologies in steel production is likely to be a result of the closure of small mills, not their use of new technology.¹²² This is in line with the policy of reforming the sector structure that emphasizes the production monopoly of SOE; SOEs are reported to receive investment credits for new modern steel production capacity.¹²³

5.2.2 Using Better Ore

Despite extensive domestic reserves, most of the iron ore used in steel production is imported, because of the low quality of the ore produced in China. The average iron content of Australian iron ore is about 62%, and Brazil and India 65%, but only about 33% for Chinese iron ore.¹²⁴ The lower iron content makes steel production more expensive and energy-intensive.

In addition, China's iron ore reserves are located in the north and northwest. The additional cost of transporting either iron ore or finished iron products to the east and south favours imported iron ore. This trend is further supported by China's focus on the production of higher-value steel products as well as higher energy-efficiency standards.

China offers ore suppliers long-term agreements on iron ore imports based on a set London Interbank offered rate (LIBOR).¹²⁵ These deals are often resource-based loan agreements, where the exporter acquires a low-interest loan in exchange for selling a specific amount of iron ore

¹²⁰ Energy management systems, use of afterheat and sintering flue gas desulfurization as well as technology standards for production i.e. non-blast furnace technology. KPMG China (2011).

¹²¹ Miller, J. W. (27 November 2012): Global Steel Industry Faces Capacity Glut. The Wall Street Journal, <http://online.wsj.com/article/SB10001424127887324595904578116761144046732.html>; and American Iron and Steel Institute (24 September 2012). Letter to Douglas M. Bell, Request for Comments Concerning China's WTO Compliance, www.steel.org/~media/Files/AISI/Public%20Policy/Testimony/AISI%20Comments%20on%20China%20Compliance%20with%20WTO%20obligations%20-%20September%2024%202012.pdf

¹²² McKinsey&Company (2009), p. 86.

¹²³ *China Daily* (1 June 2012): "Stimulus 2.0" Aims to Reboot Growth, www.chinadaily.com.cn/bizchina/2012-06/01/content_15445847.htm

¹²⁴ Holloway, Roberts and Rush (2010), p. 22.

¹²⁵ For more information on LIBOR and resource-based loan agreements see Bergsager, H. (2011): China's National Oil Policy: State Capitalism an Explanatory Framework. Master Thesis, University of Oslo.

each year to a Chinese company.¹²⁶ Having a limited number of SOEs would put China in a better bargaining position in such price negotiations for imported iron ore, in comparison to the current competition between a range of domestic actors. Several mergers and/or acquisitions have already been facilitated between SOEs.¹²⁷

The main mitigation benefits to be gained by centralizing the sector under a limited number of SOEs to gain better access to higher-quality ore include lower emissions from the more efficient processing, and potential savings in transport in comparison to the lower-quality domestic ore from remote parts of the country.

5.2.3 Relocation of Production

Relocation of production, both within China and elsewhere, can generate mitigation benefits. The relocation of industry from the traditional inland regions is driven by the state policy of centralization and cutting down excess capacity. The country's steel industry has a capacity of about 720–750 million tons per year, which exceeds demand by some 100 million tons.¹²⁸ Production is being relocated from the traditional inland steel production areas to the coastal areas. Primarily by relocating to the coast, Chinese steel industries would also gain easier access to deep-water ports – essential, as without an efficient logistical infrastructure China would have difficulties in competing on the high-value steel product markets.¹²⁹ Better access to shipping would also save energy on product transport.

Since China has become dependent on imports of iron ore, direct investments have also been made in iron ore exploration and/or iron ore mines abroad. Chinese SOEs seek acquisitions and/or mergers with oil companies or local companies for exploration and production of steel in mineral-rich countries. The *guanxi* network and the *nomenklatura* system are likely to gain importance as the state's main influence over the SOEs when they become less dependent on the state due to their foreign activities and money flows. Recent resource-based loan agreements by steel SOEs follow the same long-term policy framework

¹²⁶ The framework of these resource-based loan agreements are set up based on the experiences gain from energy-based loan agreements provided by NOCs in Central Asia and Africa. See Bergsager, H. (2012): *China, Russia and Central Asia: The Energy Dilemma*. FNI Report 16/2012. Lysaker, Norway: Fridtjof Nansen Institute.

¹²⁷ KPMG China (2011), p. 3.

¹²⁸ KPMG China (2011), p. 2.

¹²⁹ Burns, S. (21 November 2011): What China's 12th Five-Year Plan Means for the Steel Industry – Part one. *Metal Miner*, <http://agmetalmminer.com/2011/11/21/what-chinas-12th-five-year-plan-means-for-the-steel-industry-part-one/>

as previous agreements made by the Chinese oil companies active in the international markets.

Direct investments abroad are linked to a number of important mitigation measures. First, the new production facilities overseas are likely to use the latest technology, and replace lower-efficiency domestic capacity. Second, the import of high-quality iron ore stimulates the growing demand for higher-quality products and contributes to the introduction of more energy-efficient technology in China. Third, by investing in production facilities in countries such as Brazil and Australia, Chinese SOEs will gain experience of their GHG regulations.

5.3 Summary

By establishing the steel sector as a pillar industry, China's leadership is relying on the ability of a selected number of SOEs to establish a competitive and technologically advanced steel industry. This aims first of all at ensuring China's ability to produce high-quality steel products for its emerging industries, but also at strengthening its bargaining power and expansion into foreign markets. Restructuring the steel sector by promoting the market share of SOEs can deliver many outcomes that are favourable to mitigation efforts as well.

Improving the efficiency of steel production is the main tool whereby the SOEs can be involved in facilitating climate mitigation. Closures of obsolete capacity on grounds of technology standards and limits to investment credits according to set indicators (efficiency, size) serve to centralize production in the hands of SOEs. With their access to investment credits, they are able to upgrade their production facilities towards more efficient practices. Moreover, changing the location of production under SOE control can generate major energy savings in transport of raw materials and end products to international as well as domestic markets. The SOEs also have an important role to play in gaining access to better-quality iron ore, which in turn facilitates more efficient steel production processes – especially for high-quality end products.

Beyond efficiency improvements which could constitute a more detailed NAMA from the steel sector, the operations of Chinese SOEs in other countries familiarize them with carbon regulation. This can prove to be a significant capacity-building exercise, given China's plans for introducing domestic ETS system in the near future. SOEs are also influential players in domestic decision-making, so their support to such carbon regulations is important.

6. Discussion

6.1 Importance of SOEs in Mitigation-relevant Activities

Various policies launched by the Chinese bureaucracy rely on tasking the SOEs to proceed with policy implementation, including efficiency improvements and the launch of new technologies (wind power) and infrastructures (LNG, a modern power grid). The central bureaucracy sees the SOEs as a preferable alternative in terms of controlling key sectors; this is reflected in the centralization of activities, as well as in keeping control of large-scale power-generation units in the hydro and nuclear sectors in hands of few selected SOEs. As a wider mitigation-relevant task, the SOE-led modernization of the steel industry to enable better-quality products also aims at supporting the development of new high-tech sectors, like renewable energy. Finally, SOEs have made significant contributions to targeted mitigation measures implemented in China, especially through the 1000 Enterprises Programme, while also making it possible to close down small, inefficient plants: this accounted for a significant share of emission reductions (as shown in Graph 2 on page 19). Clearly, then, SOEs have played a significant role in mitigation actions in the two sectors in focus here.

What is more challenging to assess is the overall importance of SOEs in China's mitigation policies, but a rough idea can be gained by examining their role in key emitting sectors. According to McKinsey & Company,¹³⁰ in 2005 the power-generation sector was responsible for 30% of China's direct emissions, and the steel sector added another 10%. The chemical and cement industries together contributed a further 17.5%. Altogether more than half – 57.5% – of the country's emissions stem from these high-emitting sectors alone. The control of SOEs extends beyond these sectors. In all the strategic and pillar industry sectors, SOEs control a significant share of operations, and thus emissions activities – or, in the case of the power sector, zero-emission alternatives. Exact data on the share of SOEs are not available, but according to the estimates used in our steel case study, SOEs control about half of production; within the power sector, their share is roughly 60% (for more detailed estimates, see the case stud-

¹³⁰ McKinsey & Company (2009), p.10.

ies). These shares are planned to increase as regards steel and coal-fired power generation, so, over time, the actions of SOEs are likely to have significant impacts on the emissions intensity of the whole economy. In addition, being economic actors seeking competitiveness in the global markets, the SOEs may press for technology standards beyond those established by the Chinese central bureaucracy. This is shown by mergers of Chinese and foreign companies, and establishing operations overseas; moreover, in this way Chinese SOEs can gain experience of carbon regulation as practised elsewhere.

6.2 SOEs as Economic and Political Actors

Western economic thinking has automatically labelled SOEs as potentially inefficient actors, due to their soft budget constraints as a result of access to state funds and bail-outs in case of losses, as well as to the monopolistic features of their operations. Indeed, such reservations are not unfounded. However, the Chinese political system views SOEs differently. The bureaucracy has opted for control over market-driven efficiency. Even though SOEs are supported by the state, and thus not necessarily always under stringent budget constraints, they are nevertheless seen as a more efficient option than a situation of small, locally managed/owned companies, in terms of technology as well as policy implementation. As they involve a limited number of actors, SOEs serve to simplify policy implementation and improve the central bureaucracy's control over implementation. SOEs are also integrated into the administrative system; in some cases they are even allocated authority to decide on finance distribution across the sector.

Control over SOEs is maintained by the central bureaucracy through financial ties as well as the *nomenklatura* and *guanxi* networks. However, one should not underestimate the influence of the SOEs in policy-making through the very same *guanxi*, and through their growing independence due to their overseas activities. Beyond the control mechanisms, shared interests are a key. In order to understand the common ground of the central bureaucracy and SOEs, it is important to explore the underlying factors behind these policy choices.

The main driving factor behind the bureaucracy's policy-making is the desire to ensure economic growth. A competitive economy through technological development is a tool for achieving this goal. Expanding business to international markets and gaining market shares of niche industries, also illustrated by our case sectors, represent elements in such a strategy. Resource security is a further driver of policies, in terms of efficient use and access to resources. SOEs are likely to share these goals, and their own business plans may benefit from them. For instance,

gaining access to foreign resources can provide lucrative business opportunities. It is difficult to assess the power relations between the central bureaucracy and the SOEs in the converse case – when the goals of the central bureaucracy contradict those of the SOEs. However, it is clear that the SOEs have political power, and should be recognized as potentially influential actors in policy formation.

6.3 SOEs and China's International Climate Position

Given the large share of emitting activities that SOEs control and their economic and political position in the Chinese system, how should we expect SOEs to influence the country's international climate position? As regards mitigation policy, a range of PAMs described in the case studies here are being implemented by SOEs. Such PAMs are needed in order to enable reasonable targets and pledges, and in the longer term, to deliver NAMAs. China would be able to report more detailed NAMAs from both case sectors, starting from the closures of inefficient, obsolete plants and energy-efficiency standards all the way to feed-in tariffs and to renewable energy sources. SOEs have a key role in their implementation.

Policies launched in the sectors studied here have been so far been driven mainly by non-climate goals shared by the SOEs, which has made it easy for SOEs to support them. However, PAMs may look very different to SOEs if they start contradicting company interests; this seems inevitable sooner or later, should mitigation actions corresponding to the 2 °C target be launched. At the time of writing, the Chinese pilot ETS was not directly relevant to the sectors studied here, but the postponement of its country-wide expansion may be an indication of opposition from SOEs. As pointed out by Baron *et al.*, SOEs may not always respond to economic incentives in the same way as enterprises driven by profit maximization; and that makes it difficult to predict the operational and investment responses to market-based policy instruments like an ETS.¹³¹ Even though many profitable mitigation options remain – and are thus feasible to allocate to SOEs for implementation – over time, the political influence enjoyed by SOEs may shift, working against mitigation actions. That could impact on China's ability to adopt mitigation targets.

In China, domestic targets become legally binding when they are included in the core goals of the FYPs. In Copenhagen, China's pledge was

¹³¹ Baron *et al.* (2012).

clearly based on the 11th and 12th FYPs. China's NAMAs have been listed as more or less equivalent to FYP targets so far, and are therefore more macro-level than detailed. SOEs have a role in facilitating policies which can lead to emission reductions and provide sufficient certainty of success with targets to be adopted under FYPs. Relevant developments here include the central bureaucracy's control over SOEs, and the centralization of major emitting sectors to the hands of SOEs. For instance, locally managed coal-fired power plants constituted a significant uncertainty in policy outcome during the 11th FYP. But decisions as to which NAMAs are to be communicated to the UNFCCC, and how, are ultimately political – they are not a matter for the SOEs to determine.

Finally, China's considerations of the depth of its international level commitment are clearly linked to what the existing PAMs are expected to deliver in terms of future emission trends. However, international commitment, and especially its format, is a far more political issue. China's unwillingness to accept legally binding targets on the international level is driven by foreign policy concerns – in particular as regards the country's status as a developing country and its resultant insistence on the principles of common but differentiated responsibilities and historical responsibility under the UNFCCC. Beyond benefitting from the economic environment free from strict carbon constraints that follows from the central bureaucracy's position, SOEs do not seem to have a role here.

In sum, SOEs hold the key to a large share of China's mitigation potential, and should therefore be recognized as central actors as regards the country's international climate position. Although the SOE have a crucial facilitating role in terms of future emission trends, and thus generating space for the central bureaucracy to set targets at home and pledges internationally, China's international climate position and definition of NAMAs are not for them to decide: they depend on the political choices of the central bureaucracy. On the other hand, SOEs are important also beyond their facilitating role, due to their influential position in domestic policy choices – a matter that remains to be tested by launching a mitigation policy seen as unfavourable and costly to the SOEs.

7. Conclusions

This report has described the role of state-owned enterprises (SOEs) in activities relevant to climate mitigation in the Chinese economy, with case studies of the role of SOEs within two high-emitting sectors: power generation, and steel production. It is evident that SOEs are set to become even more important actors in connection with China's future GHG emissions path. Western criticisms of the role of the SOEs may not be the most constructive approach. As regards mitigation, it is more important to understand how the Chinese central bureaucracy sees SOEs and their role in the future, and to identify the related uncertainties, especially in terms of the division of power. Even though SOEs are not known to be involved in formulating the country's international climate positions, which are driven largely by considerations of ideology, it is SOEs that predominate, in terms of reducing emissions and reforming industrial sectors, when mitigation-relevant tasks are divided among actors. They thus merit greater attention in climate-policy research: after all, as the world's largest emitter of greenhouse gases, it is on China that the success or failure of international climate mitigation efforts will depend.¹³²

¹³² The IEA has actually taken a good first step on this; Baron *et al.* (2012) evaluate what a country-wide ETS would mean to power sector SOEs in China.

8. Sammanfatning

Kina er blitt det landet som har størst utslipp av klimagasser i verden. Estimer for 2010 varierer mellom 7,3 og 8,3 Gt CO₂e, som representerer 24 % av verdens totale utslipp. Det er fortsatt uklart hva Kina kan være villig til å forplikte seg til under en fremtidig global klimaavtale, da det er et utviklingsland og insisterer på prinsippet om felles, men differensiert ansvar i FNs klimaregime. Beijing har lovet kutt på 40 til 45 % i økonomiens karbonintensitet i løpet av perioden 2005–2020 og har inkludert et tilsvarende mål i sin 12. femårsplan (FYP).

Dagens kinesiske byråkratiske system er i forandring, og problemer med koordinering av administrative enheter gjør politikken uforutsigbar. Det sentrale byråkratiet ser de statlig eide foretakene (SOE-ene) som en delvis løsning på dette problemet og som et bedre alternativ enn lokale og private aktører når det gjelder kontroll over viktige sektorer. Som et resultat har den kinesiske stat foretrukket kontroll fremfor markedsdrevet effektivitet og er villig til å akseptere at SOE-ene går med kortsiktige tap, snarere enn å være avhengig av private aktører. I motsetning til private aktører kan det sentrale byråkratiet styre SOE-ene gjennom de uformelle guanxi-nettverkene og nomenklaturasystemet.

SOE-ene mottar statlig støtte til å forfølge koordinert langsiktige mål i de strategiske industriene og pilarindustrier som anses som gunstige for økonomien som helhet. SOE-ene skal også bidra til utvidelsen av Kinas handelsandel i det globale markedet og lanseringen av nisjebransjer. Ulike politiske tiltak diskutert i denne studiens to sektorer – kraftgenerering og stålproduksjon – spenner fra effektivisering og lanseringen av nye teknologier (vindkraft), infrastruktur (LNG og et moderne strømnnett) og fremskaffelse av tilgang til bedre råvarer (jernmalm) til sentralisering av produksjonen under store enheter i stedet for småskala lokal produksjon (kullfyrt kraftproduksjon, stålproduksjon) og flytting (stålproduksjon).

Det kan settes spørsmålstegn ved det sentrale byråkratiets avhengighet av SOE-ene. Den politiske og økonomiske innflytelse SOE-ene har på politikkkutforming, har økt gjennom de samme uformelle nettverk som brukes til å øke SOE-ene lojalitet til byråkratiet, guanxi og nomenklaturen. Økonomiske aktiviteter i utlandet har også endret SOE-enes prioriteter og bidratt til å distansere SOE-ene fra det sentrale byråkratiet. Så langt har de fleste miljøtiltak vært økonomisk gunstige fra SOE-enes perspektiv, men disses tilnærming til klimatiltak kan endre seg når oppgavene bli mer kostbare og innebærer færre synergier med de sentrale målene for SOE-ene enn i dag.

SOE-ene holder nøkkelen til å realisere mye av landets potensial for miljøtiltak og fortjener dermed større oppmerksomhet fra analytikere som studerer Kinas rolle i den globale klimapolitikken. Både miljøtiltak tiltenkt i fremtidige femårsplaner og forpliktelser på internasjonalt nivå er utført av SOE-ene og basert på de forutsigbare utfall de kan garantere. Det sentrale byråkratiet ser det som viktig å ivareta SOE-enes markedsdominans innenfor store utslippssektorer. Dette er klart ut fra den sentraliseringspolitikken det sentrale byråkratiet har valgt for kraftproduksjonen og stålsektoren.

SOE-ene evne til å gjennomføre tiltak i disse sektorene viser også at Kina har potensial til å annonsere mer detaljerte NAMA-er utover dagens karbonintensitet og fornybare energi mål. Selv om SOE-ene spiller en avgjørende rolle når det gjelder fremtidig utslippsutvikling, er de ikke de som avgjør landets internasjonale klimastilling og definisjon av Nama; disse sakene avhenger av de politiske valg tatt av det sentrale byråkratiet.

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China's State-Owned Enterprises as Climate Policy Actors

A significant share of the greenhouse gas emitting activities of China is operated by state owned enterprises (SOEs). This report, written by Fridtjof Nansen Institute for the Nordic Council of Ministers, discusses the role of SOEs on the electricity and steel sectors, for instance, in upgrading technologies, centralizing operations and developing alternative energy sources. Informal networks, guanxi and nomenklatura, and financial ties provide the state control over SOEs. This makes SOEs a preferable alternative to private companies. As policies limiting emission growth have been economically attractive to SOEs so far, they have shown little opposition but this may change should costly measures be introduced in the future. While China's position in climate negotiations is determined by the political leadership, the SOEs deserve attention due to their impact on China's emission trends.

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